

REMARKS

[0004] In the above referenced office action, Claims 23-29 stand rejected. To expedite prosecution, Applicant currently cancels the withdrawn claims and claim 24, amends independent claim 23 and presents new claims 52-62. Applicant reserves the right to file one or more continuing applications with claims directed to subject matter of the withdrawn claims and/or other subject matter of the instant application. Claims 23, 25-29 and 52-62 are pending in the application.

Examiner Interview of January 29, 2009

[0005] As discussed during an Examiner Interview of January 29, 2009 and explained in an Interview Summary mailed February 2, 2009, Applicant intended to amend the claims to more clearly set forth how noise reduction is achieved. Applicant submits that the amendments to claim 23 clarify that noise reduction is achieved through use of a reversible diffusion function that relies on one or more anchor values. Specifically, diffusion prior to application of a frequency domain transform reduces error in the results of the frequency domain transform. However, diffusion reduces entropy that can be relevant, especially for residual information (e.g., prediction residue, which may be sparse in a matrix). To recover the original undiffused information, after application of an inverse frequency domain transform, diffusion is applied in reverse based in part on the anchor values. Hence, the forward and reverse diffusion processes may be thought of as “bookends” to frequency domain transform and inverse frequency domain transform processes.

Rejections Under 35 USC § 102

[0006] Claims 23-29 have been rejected under 35 USC § 102(e) as being anticipated by U.S. Patent 6,600,839 to Mancuso (hereinafter “Mancuso”). For at least

the reasons set forth below, Applicants respectfully traverses the rejections of these claims and reconsideration is hereby respectfully requested.

Cited Reference

[0007] The Mancuso reference (Title) describes a non-linear adaptive image filter for filtering noise. Mancuso (Abstract) teaches a filter used for reducing artifacts, such as grid noise and staircase noise, in block-coded digital images with image block boundaries. The type of filtering is determined after an estimation of the image global metrics and local metrics. For areas of the image near grid noise, the filter performs low pass filtering. For image fine details, such as edges and texture, no filtering is performed so that masking is avoided. The filter operates in intra-field mode and uses a fuzzy logic process, pixel deltas, and dual ramp generators to determine the horizontal and vertical length of a processing window surrounding an image block boundary.

[0008] The Mancuso reference (FIG. 1) further discloses a **non-reversible** filter that supports unidirectional signal flow, from image in to image out and a filter output that **replaces** the filter input, thereby irreversibly discarding the information included in the filter input. Specifically, Mancuso teaches (column 3, lines 4-7), “The output of the filter 100 **replaces** the value assigned to a target pixel X with a function representative of the target pixel's metrics and the metrics of its neighbors” (emphasis added).

Overview of the Instant Application

[0009] The instant Application is generally related to providing tools and techniques for achieving data compression to efficiently send and receive color video images over a digital network while minimizing distortion caused by the data being compressed and subsequently decompressed. As noted in the background section of the instant Application, the Applicants recognize that “To recover the original detail once

high spatial frequency information has been discarded in favor of a higher data compression rate, however, is impossible if the data has been discarded, i.e., if an image is smoothed by having detail discarded and then compressed and transmitted, a decoder at the receiving end cannot regenerate the original detail since it has been irreversibly discarded.”

[0010] To address this issue, among others, the instant Application describes tools and techniques for providing a reversible diffusion-based compression and an exemplary compression engine. That is, the instant Application describes a reversible diffusion compression technique that can be used to reconstitute a frame by decompression without having to discard the information during the compression or decompression. In one implementation, a reversible diffusion function is applied to decrease high spatial frequency pixel values in an image or a prediction error image residue and to smooth variances between adjacent pixel values. An exemplary reversible diffusion function can increase data compression without loss of high frequency information yet operate with online encoders and decoders that lack significant processing power. An exemplary method transforms the data to make the data more amenable to compression schemes that utilize entropy transforms as an intermediate processing step, for example, prior to Huffman coding.

Anticipation Rejections

[0011] For the reasons set forth below, Applicants submit that the cited reference fails to provide sufficient evidence to support the findings and legal conclusion set forth in the Office Action (OA). As stated specifically below, the Mancuso reference fails to provide sufficient evidence under the § 102 standards. Accordingly, Applicants respectfully request that the § 102 rejections be withdrawn and the application be passed to allowance.

Claim 23

[0012] The OA (item 2, page 2) asserts that Mancuso FIG. 1 elements 102, 104, 110, FIG. 2; FIG.'s 3 through 5; FIG. 6 elements 604, 606, 610; FIG. 7, elements 718, 702, 706L, 706R; FIG.'s 8 through 11, and column 1, lines 61-63 teach or suggest each and every limitation of Claim 23.

[0013] Applicants respectfully disagree with the OA assertion and submit that the OA has mischaracterized the evidence in the Mancuso reference (particularly FIG. 1, element 110; FIG. 6 elements 604, 606, 610; FIG. 7 elements 702, 706L, 706R, 718; and FIG.'s 8-11), which neither discloses or suggests each and every limitation of Claim 23, including “the diffusion engine configured to apply **a reverse diffusion function to restore the magnitude of the at least some of the pixel values**” (emphasis added). The OA assertion that Mancuso elements 604, 606 and 610 of FIG. 6, FIG. 9 and FIG. 11 is the same as the Applicant's claimed diffusion engine that is configured to apply a reverse diffusion function in order to restore the input image from the output image is misplaced.

[0014] Specifically, FIG. 1 of the Mancuso reference along with FIG. 6 elements 604, 606, 610; FIG. 7 elements 702, 706L, 706R, 718; and FIG.'s 9-11 explicitly depict a non-reversible filter 100 having image in (101) as an input and providing an OUT output generated by a de-blocking system (110). The OUT output of the filter 100 is not read back (or reversed) by the filter 100 to reconstitute (or restore) the original pixel image. Hence, FIG. 1 of the Mancuso reference along with FIG. 6 elements 604, 606, 610; FIG. 7 elements 702, 706L, 706R, 718; and FIG.'s 9-11 cannot be asserted to be the same as the claimed diffusion engine that is configured to apply **a reverse diffusion function** in order to restore the input image from the output image.

[0015] In addition, the Mancuso reference does not teach the limitation ‘to **restore** the pixel values from the at least some of the pixel values’ (emphasis added) recited in Claim 23. On the contrary, the Mancuso reference (FIG. 1; FIG. 6 elements 604, 606, 610; FIG. 7 elements 702, 706L, 706R, 718; and FIG.’s 9-11) expressly teaches use of an interpolation function ‘to interpolate’ pixel values. Mancuso FIG. 5 expressly describes an interpolated pixel value that is computed as a new intermediate value that is different than and disposed between two known original values. Thus, in view of the fact that the filter 100 of the Mancuso reference is a unidirectional, non-reversible filter that uses an interpolation function, the Mancuso reference fails to teach or suggest a limitation ‘to restore’ the original pixel values.

[0016] In further support of the fact that the Mancuso reference does not expressly or inherently teach or suggest all the limitations recited in Claim 23, the Mancuso reference teaches (column 3, lines 4-7), “The output of the filter 100 **replaces** the value assigned to a target pixel X with a function representative of the target pixel's metrics and the metrics of its neighbors” (emphasis added). Therefore, the Mancuso reference expressly teaches against the ‘restore’ limitation recited in Claim 23.

[0017] Therefore, under the standards of § 102, the Mancuso reference does not expressly or inherently teach or suggest the particular features as recited in Claim 23, including “the diffusion engine configured to apply **a reverse diffusion function to restore the magnitude of the at least some of the pixel values**” (emphasis added).

[0018] Consequently, for at least the above reasons, Applicants respectfully submit that anticipation rejection of currently amended Claim 23 is in error, since anticipation under § 102 requires that each and every element as set forth in the rejected claim is found, either expressly or inherently described, in a single prior art reference (MPEP §2131). Accordingly, Applicants request the Examiner to withdraw the rejection of Claim 23.

Dependent Claims 25, 26, 27, 28, and 29

[0019] For reasons similar to those stated above in regards to the independent Claim 23 rejected under 35 USC § 102(e), dependent Claims 24-29 are allowable in their present form for at least this reason.

New Claims 52-62

[0020] Independent claim 52 recites an encoding process that applies diffusion and that recites “transmitting, providing access to or storing the results of the frequency domain transform in conjunction with the one or more anchor values to thereby provide for applying the reversible diffusion function in reverse, after performing an inverse frequency domain transform, to thereby return the pixel values to the undiffused state”.

[0021] Independent claim 58 recites “providing encoded video image data that correspond at least in part to one or more pixel values in a diffused state of a matrix that represents prediction error image residue” and “providing one or more anchor values selected as corresponding to one or more pixel values in an undiffused state of the matrix that represents prediction error image residue”. Accordingly, this allows for decoding, with a reduction in noise.

[0022] For at least the reasons given for claim 23, Applicant submits that independent claims 52 and 58 as well as their respective dependent claims are not anticipated by or obvious over the cited references.

CONCLUSIONS

[0023] For the foregoing reasons, the Applicants respectfully request reconsideration of the present application and pending Claims 23, 25-29 and 52-62.

[0024] Should the Examiner deem that any further action by the Applicants would be necessary for placing this application in condition for allowance, the Examiner is invited to contact the undersigned attorney at the telephone number listed below.

Respectfully submitted,
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